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I did, however, seriously question both their Cretaceous age and the stratigraphic position assigned to them by the Ameghinos. From a study of Dr. Ameghino's description of the mammalian fauna found in them, I advanced the opinion that there were mingled together in the so-called *Pyrotherium* fauna, representatives from two or more distinct horizons. This opinion Dr. Ameghino has since admitted to be a fact and has separated his *Pyrotherium* beds into two distinct formations which he separates by a long time interval. My succeeding two years of field-work in Patagonia have further convinced me as to the correctness of my former views regarding the *Pyrotherium* beds.

In referring on page 30 to the paleontologic evidences advanced by myself regarding the age of the *Pyrotherium* beds, Dr. von Ihering is quite right in saying that the tooth mentioned and figured by myself as belonging doubtfully to *Pyrotherium*, is a tooth of *Astrapotherium*, and also in maintaining that in the process of development of any mammalian phylum, certain organs may early attain a considerable degree of specialization, while the animal as a whole remains quite primitive in its structure. Everyone I presume will readily grant this, but would Dr. von Ihering have us entirely overlook the extremely close relationships, brought out on almost every page of Dr. Ameghino's papers on the *Pyrotherium* fauna, as existing between the so-called Cretaceous fauna of the *Pyrotherium* beds and that of the Santa Cruz beds, which latter are now known to be not older than Miocene? Many of the mammals described by Ameghino from the *Pyrotherium* beds are scarcely specifically distinguishable from allied forms in the Santa Cruz beds. In a few instances Ameghino has himself admitted that he can not distinguish forms from the *Pyrotherium* beds from well-known Pliocene and Pleistocene animals. Among such may be noticed the large gravigrade edentate which he is unable to distinguish from *Mylodon*, more than likely for the very good reason that it is a tooth of *Mylodon* from the Pleistocene deposits that occur throughout the greater part of Patagonia.

Considering the highly specialized character of the *Pyrotherium* fauna and its remarkably close relationship as a whole to the Santa Cruz

fauna, in connection with what we already know of the character of the stratigraphic work of the Ameghinos in Patagonia, the Cretaceous age of the *Pyrotherium* beds can no longer be seriously considered. Moreover the stratigraphic observations of Dr. Roth, Señor Mercerat and myself are all at variance with such a position for them.

On page 45 Dr. Von Ihering includes the Cape Fairweather beds in the Tehuelche formation as is also done by Ameghino. If I mistake not the term Tehuelche formation was proposed by Doering for the great boulder or shingle formation of Patagonia. Unfortunately I have never been able to see Doering's paper. If I am correct in this the Cape Fairweather beds should not be included in the Tehuelche formation since they are quite distinct and unconformable as I have been able to observe at several different localities. The Cape Fairweather beds are Pliocene while the Boulder formation is unquestionably Pleistocene. A curious account of the relations of these two deposits has been published by Dr. Ameghino in the *Geological Magazine*, for January, 1897. On page 17 in speaking of these two series of beds he says, after quoting at some length from a letter from his brother, Charles Ameghino: "According to this the boulders were deposited at the bottom of the sea and over them there extended at other periods a vast formation of marine shells." In this instance Dr. Ameghino has again reversed the true stratigraphic relations as he did for many years with the Patagonian, Supra Patagonian and Santa Cruz beds.

J. B. HATCHER.

Geological Survey of Canada. By GEORGE MERCER DAWSON, C.M.G., F.R.S., etc., Director. Annual Report. (New Series.) Vol. X. Ottawa, December, 1899.

This volume, comprising 1046 pages of text accompanied by eight maps and illustrated by twelve plates and a number of figures in the text, has just been issued by the Department and forms publication No. 679 of the Catalogue of volumes published by the Canadian Survey. It is addressed to the Hon. Clifford Sifton, M.P., Minister of the Interior, and contains many valuable reports of exploratory and geo-

logical surveys, both in the little known districts of Canada, as well as in the densely populated and older provinces of the Dominion of Canada. The volume opens with a 'Summary Report of the Operations of the Geological Survey for 1897,' by the Director.

This report describes the various publications issued during the year, the geological information on the Yukon District, Museum and office work, and also the result of boring operations in Northern Alberta. The Director also gives reports of explorations and surveys in British Columbia, Manitoba, Ontario, Quebec, Hudson Strait, New Brunswick and Nova Scotia. It is followed by Mr. W. McInnes's report 'On the Geology of the Area covered by the Seine River and Lake Shebandowan Map-Sheets,' in the gold-bearing series of Northern Ontario. The Laurentian, Couchich and Keewatin Steep Rock series, and Animikie series of rock formations occurring in that district are described and their contacts carefully noted. The localities which are productive and of economic value receive special attention and notes on the glacial geology are also included. This forms Report II. of the volume.

'Report on the Area included by the Nipissing and Temiscaming Map-Sheets,' by Mr. A. E. Barlow, forms Report I. of this volume, and comprises 302 pages of text, including two appendixes: (1) 'List of Elevations'; (2) 'On some Cambro-Silurian and Silurian Fossils from the Lake Temiscaming, Lake Nipissing and Mattawa Outliers,' by Henry M. Ami, of the paleontological staff. Mr. Barlow's report forms a very complete study of an important area of archæan rocks, in which he has described the main geological features with a great deal of pains, and gone into details of the composition of the gneisses met in the *Laurentian* of the area in question, together with their petrographical relations; also in the 'Grenville series' as developed and recognized by him in that district.

The *Huronian* system is then discussed, and the breccia-conglomerates, the diabase and gabbro and granites met with carefully described, along with their relations to the post-Archæan eruptives. He then devotes the succeeding chapters to a description of the Cam-

bro-Silurian, Silurian and Pleistocene areas included within the two maps of the district examined, and has a chapter on 'Economic Geology' describing the valuable deposits of gold, silver, nickel, copper, iron and other minerals occurring there. Regional descriptions follow, which will prove of great value to prospectors and miners in a district, full of beautiful lakes and waterfalls and magnificent scenery, and holding economic minerals of untold wealth.

Report J, by Mr. R. Chalmers, 'On the Surface Geology and Auriferous Deposits of South-eastern Quebec,' contains upwards of 160 pages of very valuable reading and illustrations, with statistics of the gold production of the Beauce and Chaudière River region of Quebec. The pleistocene marine shore-lines, the rivers and lakes, the denudation that has taken place, together with the action and products of the Appalachian glacier, the Laurentide ice, and that of the local glaciers, as well as of floating ice, are all discussed. The gold-bearing region is then described. This includes the history of mining in the Gilbert River, River du Loup, Famine River, Mill River, Slate Creek, Main Chaudière Valley, Little Ditton River, etc. The probable source of the alluvial gold is then given by the author.

'The Mineral Resources of New Brunswick,' by Professor L. W. Bailey, forms Report M of this volume and is a most welcome report. This province ought to receive as well as give more attention to the materials of economic value, which occur in the earth's crust as it is developed in that portion of the Dominion of Canada by the sea. The geological formations, in which iron, copper, nickel, antimony, lead, silver, manganese, coal, bituminous shales, graphite, peat, gypsum, granites, marbles, dolomites, ornamental stones, infusorial earths, mineral springs, and various other materials of economic value to man are to be found, are described, and the mode of occurrence of these useful materials given, together with their locations. A map of the minerals of the province accompanies the report.

Report S contains the customary and useful report of the 'Section of Mineral Statistics and Mines,' by Mr. E. D. Ingall. It contains upwards of 200 pages of valuable notes on all the

economic minerals of Canada from all the provinces, and tables of their value and of the amount produced and exported or consumed at home.

The volume contains a very complete index, which adds greatly to its value. H. M. AMI.

North American Slime Moulds. By T. H. MACBRIDE. New York, Macmillan & Co.

The appearance of this book must be gratifying to all American students of the slime moulds. It is gratifying also that it comes from the pen of one who has long been identified as an ardent student of these lowly organisms, and whose former contributions to the literature of the subject have shown signs of a conscientious student. It follows closely after the appearance of two monographs covering the species of a much wider geographical area and including the American forms; the one by Mr. George Massee of the Kew Herbarium, London, Eng., and the other by Mr. Arthur Lister, of the British Museum, London, Eng. Nevertheless, it will be found convenient for American students because it is limited to American species, and especially because the author has had an opportunity of comparing a larger number of specimens representing the American species, than perhaps were accessible to the monographers mentioned above.

Each of these three authors arrives at a different conclusion after the usual course of reasoning in the selection of the name for the entire group. Massee uses the name *Myxogastres* first applied by Fries in 1829. Lister employs the name *Mycetozoa*, given by de Bary, in 1858, which included the *Acrasieæ* of recent discovery and the *Myxogastres* of Fries. MacBride chooses the name *Myxomycetes*, substituted by Link in 1831 for Fries *Myxogastres*, but emended by deBary to include the exosporous species, the endosporous species only having been treated of by Fries and Link. The *Myxomycetes* of deBary thus formed a subdivision of his *Mycetozoa*. The author then says (p. 13), "Myxomycetes (Link) de Bary must remain the undisputed title for all true slime moulds, endosporous and exosporous alike."

In the introduction the author briefly describes the habits and morphology of the

organisms. It is evident from his discussion on page 9 et. seq., that he considers them to be plants. But he very sensibly recognizes the difficulties here presented by a group of organisms, whose vegetable characteristics on the one hand ally them to the amoeboid animals, and on the other hand give rise to no higher group. He says "it is purely a matter of indifference whether we say plant or animal, for at the only point where there is connection there is no distinction." There are given directions for the collection and care of material, and also is given a good bibliography.

In the taxonomic part of the book, the *Myxomycetes* (Link) de Bary are regarded as a class which is divided into three sub-classes. The first sub-class is the *Phytomyxineæ* Schroeter, with one species, *Plasmodiophora brassicæ* which produces the common club foot of cabbage, turnips and other cruciferous plants. The second sub-class, the *Exosporææ* Rostafinsk, includes two species, the well known *Ceratiomyxa fruticulosa* (*Ceratum hydroides*) and *C. porioides*, which may be only a variety, or form, of the first named, as suggested from material collected by the writer at Ithaca, and indeed Lister considers it a variety only (*Mycetozoa*, p. 26). The third sub-class the *Myxogastres* (Fries) MacBride, represents the *Myxomycetes* properly speaking, and it is here that the large number of genera and species are to be found. 'Keys' are given first to the orders of which five are recognized. Then under each order are given keys to the genera and species, with synonymy and diagnoses, which latter are further made lucid by copious notes in most cases. The distribution of each species as at present known to the author is also given.

In his treatment of the nomenclature the author has not been led into many very painful upheavals of antiquated names, though in several cases the species appear under unfamiliar names, the most notable being *Mucilago spongiosa* for *Spumaria alba*. Forty-four genera are treated and over two hundred species. These are illustrated by eighteen excellent plates. The work is published in the attractive way so characteristic of many of Macmillan's books.

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